REMARKS

This response responds to the Office Action dated January 13, 2004 in which the Examiner rejected claims 1-2 under 35 U.S.C. §102(b).

Claim 1 claims a method for manufacturing a ceramic oscillator, comprising the steps of; first, performing polarization processing for a mother substrate. Next, electrodes are formed on the mother substrate in discrete ceramic oscillator units. The mother substrate is then cut into discrete ceramic oscillator units, thereby obtaining discrete ceramic oscillators. The step of performing polarization processing for the mother substrate comprises finishing the application of a high DC voltage when the antiresonant frequency f_a of the mother substrate in a thickness vibration mode is measured while the voltage is applied to the mother substrate, and the antiresonant frequency f_a which is being measured has reached a target value which is the antiresonant frequency of the mother substrate during polarization corresponding to a target oscillation frequency of the ceramic oscillator as a finished product.

Through the method of the claimed invention a) finishing application of a high DC voltage when a target value, corresponding to a target oscillation frequency of a finished product, is reached and b) measuring the target value during the application of the high DC voltage, as claimed in claim 1, the claimed invention provides a method of manufacturing a ceramic oscillator in which the oscillation frequency is controlled with high accuracy while having a low cost. The prior art does not show, teach or suggest the invention as claimed in claim 1.

Claims 1-2 were rejected under 35 U.S.C. §102(b) as being anticipated by *Unami et al.* (U.S. Patent No. 5,900,790).

Applicants respectfully traverse the Examiner's rejection of the claims under 35 U.S.C. §102(b). The claims have been reviewed in light of the Office Action, and for reasons which will be set forth below, Applicants respectfully request the Examiner withdraws the rejection to the claims and allows the claims to issue.

Unami et al. appears to disclose a preferred method of making a piezoelectric resonator 10, first preparing green sheets 30 made from piezoelectric ceramic as shown in FIG. 4. On one surface of each green sheet 30, electrically conductive paste including, for example, silver, palladium, and an organic binder, is applied to form an electrically conductive paste layer 32 over almost the entire area of each green sheet 30 excluding an end portion. A plurality of green sheets 30 are laminated such that the end portions where the electrically conductive paste layers 32 are not formed on the green sheets are placed alternately in opposite directions. The laminated member with electrically conductive paste applied to opposite side surfaces is baked to form a laminated base 34 shown in FIG. 5. The laminated base 34 has a plurality of internal electrodes 36, which have been made by baking the electrically conductive layers 32. Polarizing electrodes 38 and 40 formed on opposite surfaces are connected to every other internal electrode 36, respectively, since the internal electrodes 36 are alternately exposed on opposite surfaces of the laminated base 34. When a DC voltage is applied to the polarizing electrodes 38 and 40, the laminated base 34 is polarized. Inside the laminated base 34, a high DC electric field is alternately applied between adjacent internal electrodes 36 in opposite directions. Therefore, the laminated base 34 is polarized in opposite directions at both sides of each of the internal electrodes 36 as shown by arrows in FIG. 5. The laminated base 34 is preferably surface-ground to the desired thickness since the antiresonant

frequency of the resonator is determined by the thickness of the laminated base 34. The laminated base 34 is cut by a dicing machine along dotted lines shown in FIG. 6 such that the cutting planes are substantially perpendicular to the plurality of internal electrodes 36. Then, a laminated member 42 in which the ends of the internal electrodes 36 are exposed is obtained as shown in FIG. 7. (col. 8, lines 19-55) In the piezoelectric resonator 10, the polarization direction of the active section 26, the applied electric field direction due to a signal, and the direction of vibration in the active section 26 are all the same. In other words, the piezoelectric resonator 10 is a stiffened type resonator. The stiffened piezoelectric resonator 10 has a larger electromagnetic coupling coefficient than an unstiffened piezoelectric resonator, in which the direction of vibration differs from the direction of polarization and electric field. Therefore, the piezoelectric resonator 10 has a larger frequency difference ΔF between the resonant frequency and the antiresonant frequency than the conventional piezoelectric resonator. This means that the piezoelectric resonator 10 obtains wide-frequency-band characteristics. To measure differences between stiffened and unstiffened piezoelectric resonators, piezoelectric resonators shown in FIGS. 12, 13, and 14 were made. The piezoelectric resonator shown in FIG. 12 was made by providing electrodes on two opposite major surfaces of a piezoelectric substrate measuring approximately 4.0 mm by 1.0 mm by 0.38 mm. This piezoelectric resonator was polarized in the thickness direction and vibrated in the longitudinal direction when a signal was applied to the electrodes. The piezoelectric resonator shown in FIG. 13 had the same dimensions as the piezoelectric resonator shown in FIG. 12. Electrodes were disposed on two opposite side edge surfaces of a piezoelectric substrate. The piezoelectric resonator was polarized in the longitudinal

direction and vibrated in the longitudinal direction when a signal was applied to the electrodes. The piezoelectric resonator shown in FIG. 14 was made by providing electrodes on two opposite major surfaces of a piezoelectric substrate measuring approximately 4.7 mm by 4.7 mm by 0.38 mm. This piezoelectric resonator was polarized in the thickness direction and vibrated in the plane direction when a signal was applied to the electrodes. The piezoelectric resonators shown in FIGS. 12 and 14 were an unstiffened type and the piezoelectric resonator shown in FIG. 13 was a stiffened type. (col. 9, lines 21-59) In the piezoelectric resonator 10, the inactive section 28 is preferably disposed at both ends of the base member 12. The inactive section 28 is preferably-changed to adjust the resonant frequency and the difference ΔF between the resonant frequency and the antiresonant frequency. For example, by grinding the end surfaces in the longitudinal direction of the base member 12 or by adding mass to the inactive section, the band width of the piezoelectric resonator 10 can be easily adjusted. In the piezoelectric resonator 10, the capacitance of the resonator can be easily adjusted by, for example, changing the number of layers in the active section 26. (col. 10, line 61 through col. 11, line 5) The capacitance of the resonator is proportional to the square of the number of layers in the active section 26. Therefore, the number of layers in the active section 26 is changed to adjust the capacitance of the piezoelectric resonator 10. (col. 11, lines 16-20)

Thus, *Unami et al.* merely discloses applying a DC voltage to polarizing electrodes 38 and 40 to polarize a laminated base 34 (column 8, lines 39-46). Nothing in *Unami et al.* shows, teaches or suggests <u>finishing the application of a high DC</u> voltage when a target value, corresponding to a target oscillation frequency of a <u>finished</u> product, is reached, as claimed in claim 1. Rather, *Unami et al.* merely

discloses polarizing a laminated base by applying a DC voltage to polarizing electrodes.

Additionally, *Unami et al.* merely discloses for a stiffened piezoelectric resonator, the frequency different between the resonant frequency and the anti-resonant frequency is larger than a conventional piezoelectric resonator (column 9, lines 29-34). Nothing in *Unami et al.* shows, teaches or suggests measuring the target value, corresponding to a target oscillation frequency of a finished product, during the application of a high DC voltage as claimed in claim 1. Rather, *Unami et al.* merely discloses that the frequency difference between the resonant frequency and the anti-resonant frequency is larger than a conventional piezoelectric resonator.

Since nothing in *Unami et al.* shows, teaches or suggests a) finishing the application of a high DC voltage when a target value, corresponding to a target oscillation frequency of a finished product, is reached or b) measurement of the target value occurs during the application of the high DC voltage as claimed in claim 1, Applicants respectfully request the Examiner withdraws the rejection to claim 1 under 35 U.S.C. §102(b).

Claim 2 depends from claim 1 and recites additional features. Applicants respectfully submit that claim 2 is not anticipated by *Unami* within the meaning of 35 U.S.C. §102(b) at least for the reasons as set forth above and since nothing in *Unami* shows, teaches or suggests that the target value of the antiresonant frequency of the mother board during polarization is determined from correlated data which includes first correlated data exhibiting the correlation between the oscillation frequency of the ceramic oscillator which is ultimately obtained and the antiresonant frequency of the mother substrate at room temperature and a second correlation

data exhibiting the correlation between the antiresonant frequency of the mother substrate at room temperature and the antiresonant frequency of the mother substrate during polarization. Applicants respectfully point out that *Unami et al.* at column 9, lines 21-51, merely discloses how to measure differences between stiffened and unstiffened resonators. Therefore, Applicants respectfully request the Examiner withdraws the rejection to claim 2 under 35 U.S.C. §102(b).

The prior art of record, which is not relied upon, is acknowledged. The references taken singularly or in combination do not anticipate or make obvious the claimed invention.

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested.

If for any reason Examiner feels that the application is not now in condition for allowance, applicants respectfully request that the Examiner contacts, by telephone, the applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to our Deposit Account No. 02-4800.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 02-4800.

Respectfully submitted,

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